

Laparoscopic Splenectomy for Non-Hodgkin Lymphoma

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Background and Objectives: The spleen is frequently involved in patients with non-Hodgkin lymphoma (NHL). The indications for splenectomy in this disease include amelioration of symptoms from splenomegaly, correction of cytopenias, and the need to establish the diagnosis. The aim of this study was to determine the feasibility of laparoscopic splenectomy for patients with splenomegaly and NHL.

Methods: Retrospective review was made of patients who underwent laparoscopic splenectomy for suspected NHL.

Results: A total of 57 laparoscopic splenectomies have been performed in the lateral position; 9 of these patients had NHL. All patients had splenomegaly with a mean craniocaudal length of 17.8 cm and mean morcellated splenic weight of 765 gm. The mean operating-room time was 185 min, with a mean blood loss of 108 cc. None were converted to open splenectomy, and there was no mortality. The mean postoperative stay was 2–4 days. At a mean follow-up of 6.7 months, there have been no major complications or sepsis.

Conclusions: Laparoscopic splenectomy is indicated in the setting of splenomegaly and suspected lymphoma. The operation is best performed in the lateral position, which is successful in patients with massive splenomegaly. *J. Surg. Oncol.* 1999;70:116–121. © 1999 Wiley-Liss, Inc.

KEY WORDS: laparoscopy; splenectomy; lymphoma; non-Hodgkin lymphoma; splenomegaly

INTRODUCTION

The non-Hodgkin lymphomas (NHL) are neoplasms of the component cells of the immune system and their precursors [1]. The natural history of untreated patients with NHL varies to a surprising degree. Some patients exhibit an indolent course, while others succumb in weeks from fulminant disease. Successful treatment of this myriad of tumors is dependent on an accurate diagnosis and treatment tailored to the anticipated natural history. The role of the surgeon is critical, primarily to obtain a suitable tissue sample to establish a diagnosis. Morphologically, the cells of NHL bear sufficient resemblance to their normal brethren to make a cytologic diagnosis untenable. A constellation of morphologic features that includes atypical cells, infiltration of normal lymphoid architecture, and abnormal clonal populations is required to establish the diagnosis [2,3]. The importance of obtaining an adequate biopsy of the involved lymphoid tissue, by whichever route, cannot be overem-

phasized. Typically, the specimen obtained is a lymph node and, when located peripherally, is readily accessible for excisional biopsy. Isolated retroperitoneal lymphadenectomy in the setting of suspected NHL may pose a surgical challenge that could lead to a delay in diagnosis and appropriate treatment if a laparotomy is sought to be avoided. Laparoscopy can gain access to the retroperitoneum with less morbidity and rapid recovery, which fosters patient acceptance and may expedite obtaining a diagnosis [4,5]. The advantages of minimal access techniques are well suited in this setting, provided an adequate sample is obtained.

The spleen is the largest lymphoid organ in the body and is unsurprisingly frequently involved in lymphopro-

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liferative disorders. In malignant lymphoma, splenic involvement, manifested by splenomegaly and possibly the associated features of hypersplenism, may be a presenting feature with lymphadenopathy, or it may appear later in the course of the disease. Occasionally, NHL presents with involvement limited to the spleen. In chronic lymphocytic leukemia, splenomegaly may be one of the earliest findings, but this appears to have little influence on the outcome of the disease. In hairy cell leukemia, splenomegaly may be the major finding, and subsequent splenectomy will frequently be associated with lasting remission [6,7].

Laparoscopic splenectomy (LS) is an acceptable approach to most nontraumatic indications for splenectomy. Widely utilized in the treatment of idiopathic thrombocytopenic purpura where a normal-sized spleen is expected, LS has been shown to be efficacious and safe [8,9]. The advantages of shortened hospital stay, less pain, fewer wound complications, minimal bleeding, and identification of accessory spleens without increased pancreatic injury or septic complications have fostered its acceptance. The employment of LS for patients with splenomegaly and suspected lymphoma has been rarely attempted [10] and may in fact be technically unfeasible. We have reviewed our experience with LS in patients with suspected malignant lymphoma to assess its applicability and safety.

MATERIALS AND METHODS

Lateral positioning for LS is our preferred approach and is particularly well suited for patients with splenomegaly. Enlargement of the spleen can result in unusual and rounded configurations that, in addition to sheer size and weight, make the spleen difficult to manipulate. There also may be areas of autoinfarction that lead to inflammatory adhesions to the diaphragm and omentum. Lateral positioning facilitates manipulation of the spleen by taking advantage of gravity to expose the retroperitoneal attachments and allow a safe dissection even in the presence of dense diaphragmatic adhesions. Fewer trocars are typically required and splenic retraction can be accomplished with less risk of capsular disruption.

At least 1 week prior to operation, patients receive a polyvalent pneumococcal vaccine; prophylactic antibiotics are given immediately before surgery. Proper patient positioning and padding are important to achieve maximal operative exposure and avoid neurovascular traction and pressure injuries. In patients undergoing endotracheal intubation in the supine position, a urinary catheter is placed, and any additional invasive monitoring that may be required is done prior to rolling to a right-lateral decubitus position (Fig. 1). The extended arms are secured to a double-arm board. Rolled blankets are placed at the umbilicus, between the legs and in the right axilla. The operating-room table is broken at the level of the umbi-

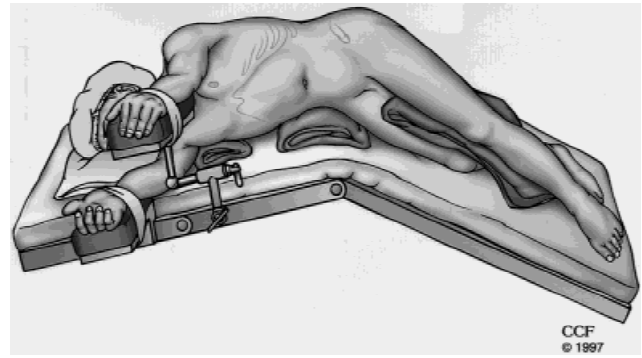


Fig. 1. Lateral positioning of the patient for laparoscopic splenectomy. The right and left arms are extended and supported. Rolled towel padding is provided for the right axilla and midabdomen. Breaking the table adds distance between costal margin and iliac crest.

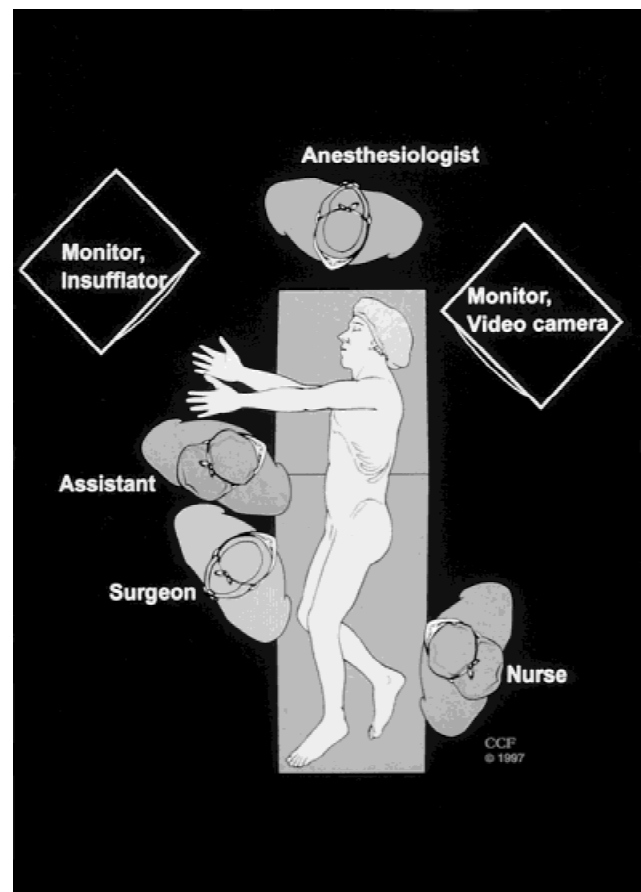


Fig. 2. Positioning of equipment and personnel for laparoscopic splenectomy.

licus to lengthen the distance between the iliac crest and the costal margin. The positioning of personnel and equipment is depicted in Figure 2. Laparoscopic splenectomy is typically a two-person operation, both facing the patient's abdomen. The surgeon and assistant direct their attention to a single video monitor over the patient's left

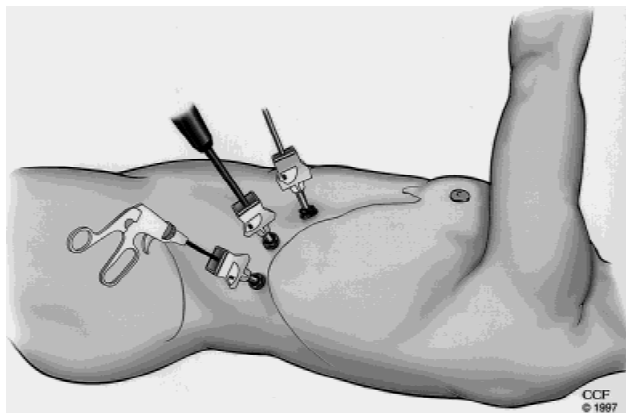


Fig. 3. Trocar positions for lateral approach to laparoscopic splenectomy. The most lateral trocar is the 11th rib. Two additional trocars are required two-finger breadth below the inferior margin of the palpable spleen margins.

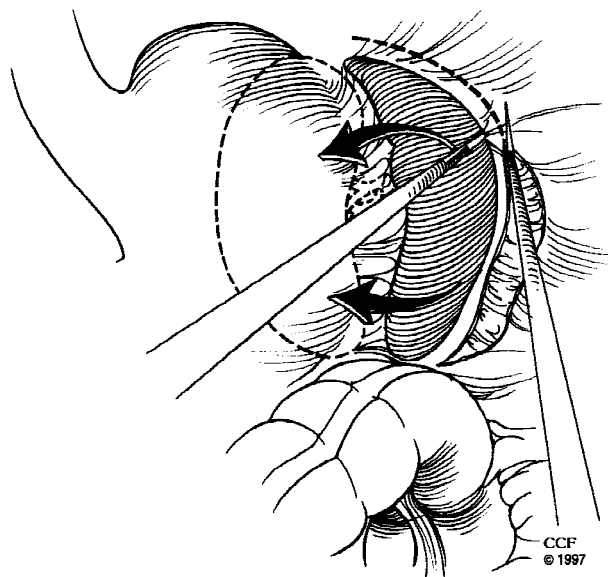


Fig. 4. Sharp dissection of the lateral peritoneal adhesions near the spleen. Dissection then proceeds lateral to medial.

shoulder for in-line operating. Reverse Trendelenburg position allows for blood and irrigation fluid to collect in the pelvis, away from the operative field.

Typically, three 10-mm ports are required (Fig. 3). Port sites are tentatively marked so that after insufflation, the optimal positions will be 4 cm below the inferior tip of the spleen, but within reach of the diaphragm. Substantial inferior and lateral placement of the trocars may be necessary with massive splenomegaly with better access to the diaphragm accomplished with a fourth or fifth trocar further posterior to the usual three trocars. The typical position of the lateral port is at the level of the 11th rib tip, the medial port is close to the midline, and the middle port is halfway between. An open insertion at

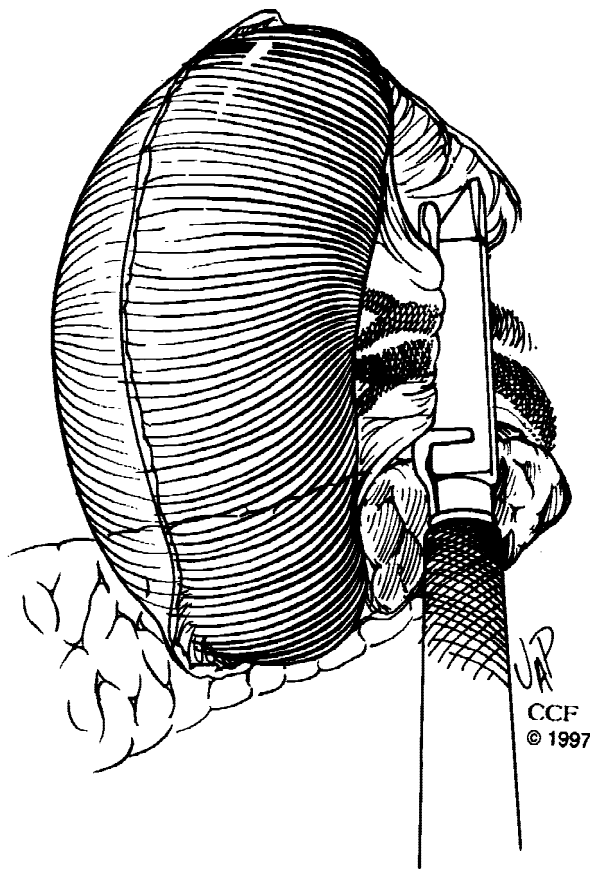


Fig. 5. A gastrointestinal anastomosis vascular staple placed across the splenic hilum, inferior to superior.

the middle port is performed, followed by all additional ports placed under laparoscopic guidance. A 10-mm, 30° or 45° laparoscope is a requirement. Mobilization of the splenic flexure of the colon is performed when necessary.

Proceeding in an inferior-to-superior direction, the peritoneal attachments are sharply divided approximately 1 cm from the spleen (Fig. 4). The dissection continues lateral to medial with minimal retraction by a blunt grasper until the pancreas and hilar vessels are visualized. Mobilizations of the inferior pole, including branches from the epiploic vessels, are divided between clips or with a harmonic scalpel. The operation proceeds best when the laparoscope is exchanged between the medial and lateral trocars and the surgeon operates with both hands. Care should be taken when mobilizing the superior pole to identify the greater curvature of the stomach and short gastric vessels. The remaining hilar pedicle is divided with a vascular gastrointestinal anastomosis stapler (Fig. 5) [11]. Several firings of the stapler are usually required and may also be used to divide the short gastric vessels. If preferred, a 10-mm right-angled clamp can individually dissect the hilar and short gastric vessels prior to placing clips. The spleen is then placed into an appropriately sized impermeable retrieval bag. This bag

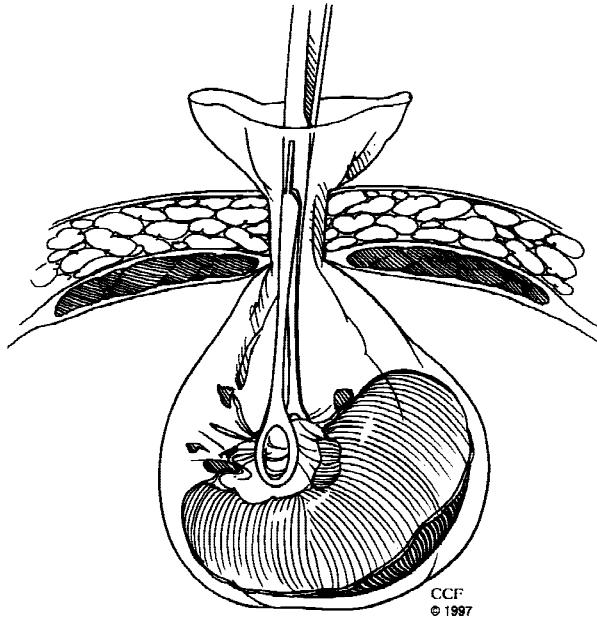


Fig. 6. Diagram of morcellation of spleen with a ringed forceps in an impermeable retrieval bag.

should be strong yet flexible so that it is easy to manipulate, but not rupture during extraction.

Often, the most challenging aspect of the operation—placing an enlarged spleen in the retrieval bag—is facilitated by placing the closed-end of the bag at the diaphragm, widely opening the bag toward the lateral trocar, holding the posterior lip of the bag with a left-handed instrument while grasping the hilum with a right-handed instrument and sliding (“surfing”) it into the bag while the patient is placed in the Trendelenburg position. Occasionally, placement of a massively enlarged spleen into the bag is expeditiously accomplished hand-assisted through a pneumosleeve device. The trocar site nearest the nondominant hand is minimally enlarged to allow insertion of the hand. The opening of the bag is delivered through the largest port site and excised in chunks with a ringed forceps (Fig. 6). The abdomen is reinsufflated, the operative site is irrigated, and hemostasis is achieved. A drain is placed if a pancreatic injury is suspected.

The patients have their orogastric tube and typically urinary catheter removed in the operating room. A liquid diet is started the evening after surgery and regular diet the first postoperative day. Patients are encouraged to ambulate beginning the day of surgery. Serum amylase and hemoglobin levels are obtained the morning following surgery if needed.

RESULTS

Over a 2-year period through June 1998, a total of 57 laparoscopic splenectomies has been performed at the Cleveland Clinic. Fourteen of these were performed for



Fig. 7. Computed tomography image of lymphoma nodules of the spleen. Multiple low attenuation lesions in the enlarged spleen are lymphomatous.

splenomegaly, including nine with lymphoma. Splenomegaly was defined as craniocaudal length over 15 cm and/or morcellated weight over 600 gm. Splenic involvement with lymphoma was suspected based on the presence of constitutional symptoms, splenomegaly, prior history of lymphoma, suspicious parenchymal nodules by computed tomography (Fig. 7), and a normal peripheral blood smear. In the nine patients with splenomegaly and lymphoma, there were five men and four women, with a mean age of 55 years (range, 34–68). All had computed tomography scans that documented an average craniocaudal length of 17.8 cm (range, 15–20). All were operated in the lateral position with a median of three trocars (range, 3–5). The mean total operating-room time was 185 min (range, 115–389) and none were converted to an open procedure. The mean morcellated splenic weight was 765 gm (range, 380–1,000). The average blood loss was 108 cc (range, 20–400). One patient had a small capsular tear; there were no other operative complications. One patient required a hand-assisted technique for placement of the spleen into the retrieval bag. There were no transfusions of any blood products at operation. One patient was transfused two units of packed red blood cells postoperatively despite having pre- and postoperative hemoglobins of 9.8 and 9.0 mg %, respectively.

None of the patients operated for lymphomatous splenomegaly had to be postoperatively admitted to the intensive care. Patients were advanced to a regular diet at a mean of 1.6 days (range, 1–4). The length of postoperative hospital stay averaged 2.4 days (range, 1–6). One patient developed atelectasis that did not progress to pneumonia and was discharged on postoperative day 4. There were no other complications and no mortality. At a mean follow-up of 6.7 months, there have been no septic or wound complications following laparoscopic splenectomy.

DISCUSSION

An estimated 55,400 cases of NHL will be diagnosed in 1998 in the United State [12]. Since the early 1970s, incidence rates for NHL have nearly doubled. This pronounced increase is likely multifactorial and includes the increased risk of lymphoma in organ transplant recipients, human immunodeficiency virus (HIV) patients, and higher rates of low-grade lymphomas in the expanding elderly population [13].

The diagnosis of NHL is suspected in patients with nonspecific constitutional symptoms and lymphadenopathy. These symptoms may include drenching night sweats, weight loss, malaise, and fevers [14]. Persistent peripheral lymphadenopathy, especially when associated with constitutional complaints, warrants an excisional biopsy for histologic diagnosis. Accurate classification of lymphoma requires microscopic inspection of nodal architecture that can only be achieved with an adequate biopsy. Subtype classification is also supplemented by analysis of clonal populations.

Non-Hodgkin lymphoma is not always associated with peripheral lymphadenopathy and, in contrast to Hodgkin disease, does not spread in a predictable pattern. The bulk of disease in NHL may be present in the abdomen both as retroperitoneal lymphadenopathy and/or as splenomegaly. Both locations lend themselves to laparoscopic techniques to expedite biopsy and treatment. Splenic involvement in NHL occurs in 35% to 80% of cases and typically presents with symptoms of splenomegaly and hypersplenism [15–18]. Commonly reported symptoms from moderate to massive splenomegaly include abdominal pain and early satiety. All forms of cytopenia have been associated with NHL and splenomegaly that may require component transfusions and interfere with aggressive chemotherapeutic regimens. Splenectomy in NHL is indicated to relieve bulk symptoms, correct cytopenias, and facilitate administration of chemotherapy [16,19,20].

Primary lymphoma of the spleen occurs rarely, representing 1% to 2.6% of all presentations of NHL [15,17,21]. These patients have splenomegaly without lymphadenopathy. Commonly, splenomegaly due to lymphoma results in splenic weights of more than 1 kg [22], but splenic size is not a reliable indicator of NHL involvement. Rosenberg [23] showed that 59% of spleens involved with lymphoma at autopsy were palpable pre-mortem, whereas 29% of palpable spleens showed no lymphoma in the spleen post-mortem. Radiologic tests may aid in heightening the suspicion of lymphoma. In addition to demonstrating splenomegaly prior to its presence on physical examination, computed tomography and ultrasound may show suspicious patterns. Computed tomography is probably the most useful radiologic test by determining splenic size, lymphoma nod-

ules 1 cm or larger, and additional retroperitoneal adenopathy [24]. The results of ultrasound have also been encouraging, with some groups obtaining a high correlation with histologic subtypes [25]. When the diagnosis of primary splenic lymphoma is confirmed by splenectomy, the outcome is usually favorable. Patients with truly localized splenic involvement have a similar survival to other stage I NHL patients and a median survival of 7.5 years without evidence of relapse has been reported [17,21].

Splenectomy for NHL is less frequently performed than for patients with Hodgkin disease since it less often has an impact on treatment options [26]. It is usually reserved for patients with symptomatic splenomegaly, cytopenias, or to establish the diagnosis. Often in the setting of splenomegaly, conventional splenectomy has been associated with complication rates of 30% and mortality in 11% [27,28]. Laparoscopic splenectomy has been shown to be an effective alternative approach in patients with hematologic diseases, particularly idiopathic thrombocytopenic purpura. Although with a longer operative time, the operation is associated with less ileus, earlier toleration of diet, shorter hospitalization, less pain, and overall less expense [29,30]. Laparoscopic splenectomy for suspected lymphoma has not been advised in the past when associated with splenomegaly. The enlarged spleen was considered difficult to manipulate and hindered control of the splenic hilum. We would concur in patients approached anteriorly where conversion rates of 20% are typical even in the absence of splenomegaly [31]. Our data have shown that laparoscopic splenectomy for lymphoma in the setting of splenomegaly is safe and technically feasible when performed in the lateral position. We have found that the operation can be performed with little blood loss and rare complications. A shortened hospitalization and rapid recovery were added benefits. The lateral position has been shown to be superior to the anterior approach for normalized spleens [32,33], and our data expand its utility for patients with lymphoma and splenomegaly.

Alterations that may be valuable when operating on patients with splenomegaly include inferior and lateral placement of the trocars, additional trocars as necessary, and hand-assisted placement of massive spleens into the retrieval bag.

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